BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 19 October 1999

Case Number: T 0888/97 - 3.4.2

Application Number: 90307780.8

Publication Number: 0410623

IPC: H05K 3/34

Language of the proceedings: EN

Title of invention:
Method and apparatus for soldering articles

Patentee:
AT&T Corp.

Opponent:
Robert Bosch GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 54, 56, 84
EPC R. 29(1)

Keyword:
"Added subject-matter (main and fourth subsidiary requests: yes)"
"Novelty (first and second subsidiary requests: no)"
"Inventive step (first to third subsidiary requests: no)"
"Clarity (fourth subsidiary request: no)"

Decisions cited:
-

Catchword:

-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0888/97 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 19 October 1999

Appellant: (Proprietor of the patent)
AT&T Corp.
32 Avenue of the Americas
New York
NY 10013-2412
ETATS-UNI D'AMERIQUE

Representative:
Johnston, Kenneth Graham
Lucent Technologies (UK) Ltd
5 Mornington Road
Woodford Green
Essex IG8 0TU
ROYAUME-UNI

Respondent: (Opponent)
Robert Bosch GmbH
Zentralabteilung Patente
Postfach 30 02 20
70442 Stuttgart
ALLLEMAGNE

Representative:
Röser, Peter, Dipl.-Ing.
c/o Robert Bosch GmbH
Postfach 30 02 20
70442 Stuttgart
ALLLEMAGNE

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 24 June 1997 revoking European patent No. 0 410 623 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: R. Zottmann
V. Di Cerbo

Summary of Facts and Submissions

I. The Appellant (Patentee) lodged an appeal against the decision of the Opposition Division revoking the European patent No. 0 410 623 with the application No. 90 307 780.8.

The opposition was based on the grounds of opposition laid down in Article 100(a) EPC that the subject-matter of the patent was not novel and at least did not involve an inventive step.

The reasons for the Opposition Division's decision were that amended claim 1 did not comply with Article 123(2) and (3) EPC and was not inventive in view of document

D1: ELEKTRONIK PRODUKTION & PRÜFTECHNIK, April 1989, pages 37-39.

II. Oral proceedings were requested by both parties and appointed. In a communication accompanying the summons, the Board expressed its preliminary opinion that none of claims 1 of the main request, third and fourth subsidiary requests complied with the requirements of the EPC.

At the oral proceedings, only the Representative of the Opponent was present. At the end of the oral proceedings the decision of the Board was announced.

III. In the statement of the grounds of appeal the Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims as amended with the letter dated 6 September

1995 (hereinafter called main request) or, in the alternative, on the basis of the claims as granted (hereinafter called first subsidiary request) or on the basis of three further auxiliary requests filed together with the statement of the grounds of appeal (hereinafter called second to fourth subsidiary request), and the description and drawings as granted.

The Respondent requested that the appeal be dismissed.

IV. Claim 1 of the main request reads as follows:

"1. A method for fabricating an object by soldering at least one article to a metallized area on a major surface of the object CHARACTERIZED BY

applying a low solids resin containing soldering paste to a metallized area on a major surface of an object;

placing an article on the solder paste-coated metallized area;

applying an acid to the solder paste;

subjecting the object to a substantially inert atmosphere; and

reflowing the solder paste on the object while the object and article are subjected to the inert atmosphere, to bond the object to the article with reduced incidence of solder paste residues."

Claims 1, 4 and 5 of the first subsidiary request read as follows:

"1. A method for soldering at least one article e.g. an electronic component to a metallized area on a major surface of a substrate, e.g. a circuit board

CHARACTERIZED BY

applying a low solids soldering paste to a metallized area on a major surface of a substrate;

placing an article on the solder paste-coated metallized area;

applying an acid to the solder paste;

subjecting the substrate to a substantially inert atmosphere; and

reflowing the solder paste on the substrate while the substrate is subjected to the inert atmosphere."

"4. The method according to claim 1 CHARACTERIZED IN THAT the steps of applying the acid and reflowing the solder paste are performed simultaneously.

5. The method according to claim 1 CHARACTERIZED IN THAT the step of applying the acid to the low solids paste is performed prior to reflowing the paste."

Claim 1 of the second subsidiary request is identical with claim 1 of the first subsidiary request.

Claim 1 of the third subsidiary request reads as follows:

"1. A method for soldering at least one article e.g. an electronic component to a metallized area on a major surface of a substrate, e.g. a circuit board, comprising

applying a soldering paste to a metallized area on a major surface of a substrate

placing an article on the soldering paste-coated metallized area

applying an acid to the soldering paste

reflowing the soldering paste on the substrate CHARACTERIZED BY

applying, in said applying step, a low solid soldering paste

subjecting the substrate to a substantially inert atmosphere after the acid has been applied to the soldering paste and

reflowing the soldering paste while the substrate is subject to the inert atmosphere."

Claim 1 of the fourth subsidiary request reads as follows:

"1. A method for soldering at least one article e.g. an electronic component to a metallized area on a major surface of a substrate, e.g. a circuit board, comprising

applying a soldering paste to a metallized area on a major surface of a substrate

placing an article on the soldering paste-coated metallized area

applying an acid to the soldering paste

reflowing the soldering paste on the substrate CHARACTERIZED BY

applying, in said applying step, a low solid soldering paste of the kind that will leave, after soldering, a volume of residue of 3% or less

subjecting the substrate to a substantially inert atmosphere after the acid has been applied to the soldering paste and

reflowing the soldering paste while the substrate is subject to the inert atmosphere."

VI. The arguments of the Appellant are summarized as

follows:

The phrase "... a low solids resin containing soldering paste ..." of claim 1 of the main request - hereinafter called feature (a1) - is explicitly described and directly derivable from the application as originally filed. It is also clear and concise since a person skilled in the art knows that a low solids soldering paste is a paste that will leave, after soldering, a volume of residue of 3% or less.

The problem underlying the patent as granted should be replaced by the following problem: "A reflow soldering technique which provides a reduced amount of residue left, causing as little corrosion as possible to the reflow soldering apparatus." D1 is in contradiction to the new problem since it discloses the reflowing of solder in a reducing atmosphere in which acid vapour is mixed with nitrogen. Claim 1 is clearly inventive in requiring the substrate to be subject to inert atmosphere that is neither oxidising nor reducing when the soldering paste is reflowed.

No comments were made on the patentability of the claims of the second to fourth auxiliary requests.

VII. The arguments of the Respondent are summarized as follows:

Feature (a1) of claim 1 of the main request cannot be taken from the original application documents. Claims 1 of the first to third subsidiary requests are not novel, at least not inventive with respect to D1. The feature (d1) of claim 1 of the third subsidiary request

that the substrate is subject to a substantially inert atmosphere **after** the acid has been applied to the soldering paste is suggested by page 37, column 1, second paragraph last sentence, the passage bridging columns 2 and 3 and section 6.1, paragraph 2. From these passages it follows indirectly that inert gas is always present during the soldering process and that acid is necessary in any case at the beginning.

Claim 1 of the fourth subsidiary request does not comply with the requirements of Articles 123(2) and 84 of the EPC.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Interpretation of claim 1*

Claim 1 as granted does not determine the succession at least of the treating steps (c) (application of the acid), (d) (application of the inert atmosphere) and (e) (reflowing) and does not define that one of these steps is finished when the next step, that is the step following in the text of the claim, is beginning. The same applies also to the corresponding steps of claims 1 of the remaining requests. For example, said three steps could be carried out during the same time interval (see in particular claims 4 and 5 as granted which are identical with the original claims 4 and 5,

the description of Figure 3, paragraph 2 of page 6 as originally filed and lines 19 to 26 of page 7 as originally filed). Application of the acid in the sense of the patent (feature (c)) does not exclude a continuous contact with an acid vapour, e.g. during the exposure of the substrate to an inert atmosphere or a substantially inert atmosphere (feature (d)) - also during the reflow step. This applies also to claims 1 of the third and fourth subsidiary requests.

As to feature (d1) of claims 1 of the third and fourth subsidiary requests, it should be noted that it means only that the acid applying step has begun before the step of applying inert gas is beginning.

A low solids soldering paste is a paste containing a reduced amount of flux compared with conventional pastes (see EP-B-0 410 623 column 1, lines 36 to 38, column 2, lines 40 to 54 and column 4 third paragraph).

3. *Main request*

The insertion "resin containing" into claim 1 (part of feature (a1)) has no basis in the application documents as originally filed. Only rosin is disclosed there as component of the solder paste. Since, furthermore, there is no hint in the application as originally filed that other tacky components than rosin are suitable for the purpose and which could be regarded as a resin, said insertion infringes Article 123(2) EPC.

4. *First subsidiary request*

Document D1 describes a method for soldering at least

one article to a metallized area on a major surface of a substrate (see e.g. section 1 end of the first paragraph, section 2 first lines and section 6.3 second paragraph). In the first part of section 1 it is stated that electrical connection of semiconductor chips is made by soldering pre-assembled parts by reflowing preforms. This necessarily means that a soldering paste be applied to a metallized area on a surface, usually a major surface, of a substrate and the article be placed on the solder paste-coated metallized area. Said prior art document furthermore discloses using of a reducing acid, preferably formic or acetic acid, which are gaseous, as flux means and to subject the substrate to an inert atmosphere, also during the reflow step (see section 2 and 3). In section 6.2 it is regretted that the soldering pastes being commercially available contain more flux substance as necessary for soldering under inert gas and thus recommends the use of a low solids soldering paste. If such pastes were not on the market at the application date this would be of no relevance since pastes with a low content of flux substance could be easily manufactured by the skilled person.

Therefore, the subject-matter of claim 1 is not novel in the sense of Article 54 EPC with respect to prior art D1. It is in any case not inventive in the sense of Article 56 EPC, since expressions or features not literally or explicitly disclosed in said document - use of a **substantially** inert atmosphere, applying the paste to a **major** surface of a substrate - are trivial or self-evident for the skilled person.

The Appellant argues that the problem underlying the

solution has to be supplemented by the aim to cause as little corrosion as possible to the reflow apparatus and that said partial problem is solved by claim 1 in that the substrate is neither exposed to oxidizing nor to reducing gas components during reflowing and that this is not disclosed in D1. This arguing is not convincing, since claim 1 does not establish that the contact of the acid with the substrate has been finished before the reflow step is started (see section 2 above).

5. *Second subsidiary request*

Claim 1 is identical with claim 1 of the first subsidiary request and thus the arguing with respect to the latter applies also to claim 1 of the second subsidiary request.

6. *Third subsidiary request*

The reflow step of the method according to D1 is characterized in that the substrate is subject to the inert atmosphere mixed with an acid gas component (see e.g. Figure 1 and corresponding description). The same applies to the reflow step of claim 1, since it comprises the alternative that the substrate is simultaneously subject to gaseous acid, see section 2 above and claim 3. Since a part of said feature is contained in the characterizing part of claim 1, said claim is not correctly delimited against the nearest prior art and does not comply with Rule 29(1) EPC.

As a further consequence, claim 1 differs from claim 1 of the first subsidiary request only by feature (d1)

which means only that step (c) has begun before step (d) is beginning, see section 2 above. However, such an acid application is suggested by D1, since on page 37, section 1 last 13 lines it is stated that a reduction of the metal oxides shortly before the soldering is advantageous and that the soldering process can be further improved when the inert atmosphere is admixed with reducing gas components. When said gas components lead to corrosion of the apparatus, the skilled person would apply such gas components as late as possible, that is only after application of the substance for reducing of the metal oxides and not before the reflow step is starting. Claim 1 is thus not inventive in the sense of Article 56 EPC.

7. *Fourth subsidiary request*

The feature of claim 1 that the low solids soldering paste is of the kind that will leave, after soldering, a volume of residue of 3% or less has no basis in the documents as originally filed. On page 3, it is mentioned that "a low solids (or residue) paste will yield between 1 and 3% residues". Since the volume of residue is strongly depending on the soldering conditions (materials, temperature, temperature course etc.), which are not defined in claim 1, said feature of claim 1 defines at the utmost an aim but not a clear technical teaching. Thus claim 1 does not comply at least with Articles 123(2) and 84 EPC.

8. Since claims 1 of all requests are not allowable, none of the requests is allowable and it is not necessary to examine the remaining claims.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini